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9. A method of manufacturing a transmission line coupler comprising the steps of:

manufacturing a plurality of substrate layers;

etching at least five metal layers, comprising a first metal layer, a second metal layer, a third metal layer, a fourth metal layer, and a fifth metal layer, disposed on at least a subset of said plurality of substrate layers, wherein said second metal layer is part of a segment of ~~a~~said transmission line coupler and is between said first metal layer and said third metal layer, said third metal layer is between said second metal layer and said fourth metal layer, and said fourth metal layer is part of another segment of ~~a~~said transmission line coupler and is between said third metal layer and said fifth metal layer;

connecting said third metal layer to said first metal layer and said fifth metal layer to form groundplanes such that the first metal layer forms a first groundplane, the third metal layer forms a second groundplane, and the fifth metal layer forms a third groundplane; and

connecting the coupler segment disposed on said second metal layer to the coupler segment disposed on said fourth metal layer by a transmission line structure to form ~~a~~said coupler.

13. The method of manufacturing a coupler of claim 9, wherein said transmission line coupler has a frequency of operation between approximately 0.5 GHz and approximately 6.0 GHz.

14. The method of manufacturing a coupler of claim 9, wherein said transmission line coupler is a wideband coupler.

Please Add the following new claim

25. The method of claim 9 wherein:

connecting said third metal layer to said first metal layer and said fifth metal layer comprises connecting by a plurality of transmission line structures; and

connecting the coupler segment disposed on said second metal layer to the coupler segment disposed on said fourth metal layer comprises connecting by a transmission line structure.

REMARKS

Applicant's remarks, below, are preceded by related comments of the Examiner, presented in small bold-faced type.

1. The title of the invention is not descriptive. . . .
2. Preliminary Amendment page 1, ... should be changed to . . . This amendment, currently preceding the title of the invention, should be moved
3. Preliminary Amendment page 2, Introduction, lines 8-9 and again on line 12, "... should be changed

The amendments suggested by the examiner have been made

Claim Objections

4. Claims 9-16 are objected to because of the following informalities:

- a. "a segment of a coupler" should be amended to: -- a segment of said coupler -- page 45, line 21.
- b. "another segment of a coupler" should be amended to: --another segment of said coupler --on page 45 line 24 - page 46 line 1.
- c. "to form a coupler" should be amended to: -- to form said coupler -- on page 46 line 7.

The corrections suggested by the examiner have been made.

Claim Rejections - 35 USC § 102

5. Claims 9-11, and 13-15 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 5,929,729, Swarup.

Swarup teaches, according to Figure 6B, manufacturing a coupler comprising the steps of:

- Manufacturing a plurality of substrate layers
- Etching at least five metal layers disposed on a subset of the substrate layers
- Connecting the second metal layer (198) with the fourth metal layer (190) to form a coupler
- Connecting the first metal layer (202) with the third metal layer (194) and the fifth metal layer (206) to form groundplanes
- Connecting at least two of at least five metal layers with via holes (Fig 6B)

Claim 9, as presented to the Examiner, recited “connecting said third metal layer to said first metal layer and said fifth metal layer to form groundplanes.” This claim element requires three groundplanes - i.e., the first metal layer forms a first groundplane, the third metal layer forms a second groundplane, and the fifth metal layer forms a third groundplane. Just in case the Examiner read claim 9 to require less than three groundplanes, claim 9 has now been amended to recite that “the first metal layer forms a first groundplane, the third metal layer forms a second groundplane, and the fifth metal layer forms a third groundplane”

It is also clear from claim 9 that the claimed transmission line coupler includes two segments. A first segment of the transmission line coupler is located between the groundplanes formed by the first and third metal layers, and a second segment of the transmission line coupler is located between segments formed by the third and fifth metal layers.

Swarup does not teach or suggest a transmission line coupler having two segments, with a first segment located between a first and second groundplane, and a second segment located between the second and a third groundplane as recited by claim 9. Because Swarup does not teach or suggest all elements recited by claim 9, a rejection under 35 U.S.C. 102(e) for anticipation is improper. Consequently, claim 9 and its dependent claims 10-16 are patentable over Swarup.

Additional Comments

What Fig. 6B of Swarup discloses is the manufacture of a coupler formed from lumped elements, such as capacitors and spiral inductors. Swarup’s capacitors and inductors are not transmission line couplers. The term transmission line coupler is well

known in the art and refers to a signal component having an input signal line and one or more output signal lines.

Claim Rejections - 35 USC § 103

6. Claims 12 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swarup in view of US Patent 3,761,843 Cappucci.

Cappucci fails to teach or suggest the elements of claim 9 that were missing from Swarup. That is, neither Cappucci or Swarup, alone or in combination, teach or suggest a transmission line coupler having two segments, with a first segment located between a first and second groundplane, and a second segment located between the second and a third groundplane as recited by claim 9. Because Cappucci and Swarup do not teach or suggest all elements recited by claim 9, a rejection under 35 U.S.C. 103 for obviousness is improper. Consequently, claim 9 and its dependent claims 10-16 are patentable over a combination of Swarup and Cappucci.

Added Claims

Claim 25 has been added and recites connecting said third metal layer to said first metal layer and said fifth metal layer comprises connecting by a plurality of transmission line structures and connecting the coupler segment disposed on said second metal layer to the coupler segment disposed on said fourth metal layer comprises connecting by a transmission line structure.

Support for the use of transmission lines to connect groundplanes is found at, for example, p. 32, lines 7-11 and ground via holes 2308 in Fig. 23b. The specification also supports the use of transmission lines to connect coupler segments at, for example, p. 32, lines 7-11 and via hole 2310 in Fig. 23b. A transmission line comprising via ground holes 2308 and via holes 2310 is also shown in Fig. 23b. Ground via holes 2308 are portions of transmission lines used to connect groundplanes 2306. Neither Swarup nor Cappucci teach or suggest the use of a plurality of transmission lines to provide ground connections. For at least this additional reason, Claim 25 is patentable over a combination of Swarup and Cappucci.

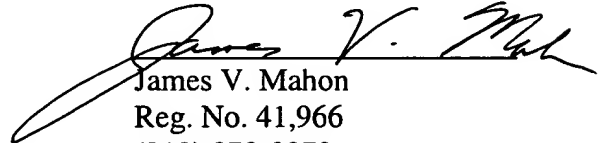
CONCLUSION

Claims 9, 13, 14 have been amended and claim 25 has been added. Claims 9-16 and 25 are now pending and believed to be in condition for allowance. Applicant respectfully requests that all pending claims be allowed.

Please apply any credits or excess charges to our deposit account number 50-0521.

Respectfully submitted,

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